



Long-term Blood Pressure Control using LSSS in a Post-Nephrectomy Patient- Case report

Dr. N. Murugesan¹, Dr. S. C. Rajan², Sumathy Masanam Kasi^{3*}

¹Chief Nephrologist, East coast hospitals, Puducherry, India

²Consultant Family Medicine, East Coast Hospitals, Puducherry, India

²Research coordinator, East Coast Hospitals, Pondicherry, India.

*Corresponding Author

Sumathy Masanam Kasi

Research coordinator, East
Coast Hospitals,
Pondicherry, India.

Article History

Received: 19.10.2025

Accepted: 29.12.2025

Published: 21.01.2026

Abstract: -

Introduction: Hypertension is a leading modifiable risk factor for cardiovascular disease and chronic kidney disease. Despite the availability of pharmacotherapy, therapeutic non-adherence remains a significant barrier to blood pressure (BP) control. Low-Sodium Salt Substitutes (LSSS) offer a promising non-pharmacological strategy to bridge this adherence gap.

Case Presentation: A 44-year-old female with a history of right nephrectomy and chronic non-adherence to antihypertensive therapy presented to the outpatient department with severe occipital headaches and a BP of 160/100 mmHg. Given her solitary kidney, a specialized intervention focusing on sodium reduction was initiated. The patient was started on a strict LSSS protocol alongside restarted pharmacotherapy.

Results: Over an eight-week follow-up period, the patient demonstrated high adherence to the LSSS regimen. Her BP stabilized from 160/100 mmHg to 110/70 mmHg. Significant secondary outcomes included a 9.3 kg weight reduction (67.3 kg to 58.0 kg) and the resolve of persistent headaches. Renal parameters remained optimal, with serum creatinine improving from 0.75 mg/dL to 0.50 mg/dL, and electrolytes remained stable (Potassium 4.0–4.3 mmol/L).

Conclusion: This case demonstrates that LSSS is a highly effective, safe, and low-cost modality for managing uncontrolled hypertension in high-risk patients, including those with a solitary kidney. The intervention not only facilitated rapid BP stabilization but also supported significant weight loss and renal preservation. These findings support the wider implementation of LSSS in primary care to meet global World Health Organization (WHO) sodium reduction targets.

Keywords: Hypertension, Sodium-Restricted Diet, Salt Substitutes (LSSS), Nephrectomy, Treatment Adherence, Weight Loss.



This is an open access article under the [CC BY-NC](https://creativecommons.org/licenses/by-nc/4.0/) license



Introduction

Hypertension remains the leading global non-communicable disease and the primary modifiable risk factor for cardiovascular disease, stroke, and chronic kidney disease. (1) Global surveys indicate that high blood pressure affects approximately one in every four adults and is responsible for an estimated 1.6 million deaths annually (2). While hypertension is manageable through a combination of pharmacotherapy, dietary modifications, and

physical activity, achieving optimal control remains a significant clinical challenge. (3,4)

A primary barrier to successful management is patient non-compliance with long-term medication regimens and lifestyle changes. (5) Uncontrolled blood pressure is influenced by a complex interplay of factors, including psychological stress, sedentary lifestyles, and poor dietary habits—specifically excessive salt intake. (6,7)

Cite this article:

Murugesan, N., Rajan, S. C., Kasi, S. M., (2026). Long-term Blood Pressure Control using LSSS in a Post-Nephrectomy Patient-Case report. *ISAR Journal of Medical and Pharmaceutical Sciences*, 4(1), 5-7.

Non-pharmacological "adjuvant" therapies, such as reduced dietary sodium and increased physical activity, are essential for blood pressure maintenance. Among these, the implementation of Low-Sodium Salt Substitutes (LSSS) has emerged as a high-impact, low-cost strategy.⁽⁷⁾ By replacing traditional sodium chloride with mineral-enriched alternatives, clinicians can address the dietary contributors to hypertension while improving long-term adherence in patients who struggle with traditional lifestyle restrictions.

Case Presentation:

History of Present Illness A 44-year-old female presented to the Outpatient Department (OPD) for a routine clinical review. The patient had a significant surgical history, having undergone a right nephrectomy in 2004 due to a defective kidney and chronic abdominal pain. Her obstetric history was notable for postpartum hypertension following her second pregnancy, which subsequently transitioned into chronic essential hypertension. Despite being prescribed antihypertensive therapy for several years, the patient reported a history of poor medication adherence. She presented currently with a persistent, severe occipital headache (at the back of the head) that had intensified since September.

Clinical Assessment Upon examination in the OPD, the patient was found to be hypertensive with a BP of 160/100 mmHg. Physical examination was otherwise unremarkable. Given her history of a solitary kidney, maintaining optimal renal perfusion without excessive sodium load was critical. Baseline laboratory investigations were within normal limits, though a slight elevation in urea was noted initially.

Management and Dietary Intervention

The patient was started on Telmisartan 20 mg twice daily and initiated on a strict Low-Sodium Salt Substitute (LSSS) protocol. Counselling emphasised sodium reduction to decrease vascular resistance and protect her solitary kidney. To ensure safety and efficacy, the patient performed home blood pressure monitoring twice daily using a digital monitor and maintained a detailed log. Clinical progress was monitored bi-weekly over a two-month period.

As non-pharmacological interventions stabilised her blood pressure, the Telmisartan dosage was progressively reduced into a maintenance level: Weeks 1–4: 20 mg–0–20 mg (40 mg/day) Weeks 5–6: 20 mg–0–10 mg (30 mg/day) Weeks 7–8: 10 mg–0–10 mg (20 mg/day maintenance)

Clinical Outcomes: The integration of antihypertensive therapy, LSSS implementation, and improved adherence yielded the following improvements:

- **Blood Pressure Stabilization:** BP decreased progressively from 160/100 mmHg to 110/70 mmHg.
- **Renal Parameter Optimisation:** Serum urea levels dropped from 2.2 mg/dL to 0.9 mg/dL. Serum creatinine remained stable and favorable, moving from 0.75 mg/dL to 0.50 mg/dL, reflecting excellent renal clearance.
- **Electrolyte Stability:** Despite the use of potassium-based salt substitutes, electrolytes remained stable: Sodium (136–145 mmol/L) and Potassium (4.0–4.3 mmol/L).
- **Weight Reduction:** The patient achieved a significant and steady weight loss of 9.3 kg.

Table 1: Longitudinal Clinical Parameters Following LSSS Intervention

Follow-up Period	Blood Pressure (mmHg)	Body Weight (kg)	Serum Urea (mg/dL)	Serum Creatinine (mg/dL)
Baseline (OPD)	160/100	67.3	2.2	0.75
Week 2	130/80	63.0	1.8	0.63
Week 4	110/80	59.7	1.2	0.60
Week 8 (Final)	110/70	58.0	0.9	0.50
Total Change	-50 / -30	-9.3 kg	-1.3	-0.25

Discussion

This case highlights the profound impact of Low-Sodium Salt Substitutes (LSSS) as a primary intervention for uncontrolled hypertension, particularly in patients with a reduced renal mass. The patient's clinical trajectory—moving from a hypertensive crisis (160/100 mmHg) to stable normotension (120/70 mmHg)—demonstrates that dietary sodium modulation can successfully overcome long-standing therapeutic non-adherence.

The Solitary Kidney and Sodium Sensitivity

The patient's history of a right nephrectomy is a critical factor in her salt sensitivity. In individuals with a solitary kidney, the remaining nephrons undergo compensatory hyperfiltration to maintain glomerular filtration rate (GFR). Excessive dietary sodium increases intraglomerular pressure, which accelerates the

risk of hypertensive nephrosclerosis. By implementing LSSS, we effectively reduced the "sodium-volume" load, thereby lowering systemic vascular resistance and protecting the solitary kidney from further barotrauma. This is reflected in the stabilisation of her urea and creatinine levels despite the reduction in antihypertensive dosage. (6-7)

Weight Loss and Extracellular Fluid Volume

The significant weight loss of 9.2 kg observed over eight weeks is a notable secondary outcome. In salt-sensitive hypertension, high sodium intake leads to significant water retention in the interstitial space. The transition to LSSS triggers a "natriuretic effect," where the body sheds excess extracellular fluid. Furthermore, clinical evidence suggests that reducing dietary sodium may improve metabolic efficiency and reduce the cravings for calorie-dense,

processed foods, which are the primary vehicles for salt in modern diets. (6)

Addressing the Adherence Gap

A key observation in this case was the resolution of the "adherence gap." Traditional salt-free diets are often rejected by patients due to poor palatability, leading to the non-compliance noted in this patient's history. LSSS provides a "behavioral bridge," allowing patients to maintain the sensory experience of salted food while meeting the World Health Organization's (WHO) global target of <2g of sodium per day. The stability of her serum potassium (4.0–4.3 mmol/L) further reinforces that LSSS is a safe modality for patients with stable renal clearance, even with a solitary kidney.(5,8)

Clinical Implications for Primary Care

Translating the WHO 2025 goals into clinical practice requires low-cost, scalable interventions. This case proves that LSSS is not merely an adjunct but a foundational therapy. For the primary care provider, the "window of opportunity" lies in deploying salt substitution before the onset of permanent target organ damage, such as left ventricular hypertrophy or chronic hypertensive heart disease. (1,8-10)

Conclusion

This case reinforces that LSSS is a highly effective modality for managing hypertension and promoting weight loss, especially in high-risk renal profiles. The significant reduction in blood pressure and the preservation of renal function in a post-nephrectomy patient provide a compelling argument for the wider adoption of salt substitutes in primary healthcare.

References

- World Health Organization. (2023). *Global report on hypertension: the race against a silent killer*. World Health Organization. Available from: <https://www.who.int/publications/i/item/9789240081062>
- Anchala, R., Kannuri, N. K., Pant, H., Khan, H., Franco, O. H., Di Angelantonio, E., & Prabhakaran, D. (2014). Hypertension in India: a systematic review and meta-analysis of prevalence, awareness, and control of hypertension. *Journal of hypertension*, 32(6), 1170-1177. doi: 10.1097/HJH.000000000000146. PMID: 24621804; PMCID: PMC4011565.
- Neal, B., Wu, Y., Feng, X., Zhang, R., Zhang, Y., Shi, J., ... & Elliott, P. (2021). Effect of salt substitution on cardiovascular events and death. *New England Journal of Medicine*, 385(12), 1067-1077. doi: 10.1056/NEJMoa2105675. Epub 2021 Aug 29. PMID: 34459569.
- Pickering, T. G. (1992). Predicting the response to nonpharmacologic treatment in mild hypertension. *JAMA*, 267(9), 1256-1257. PMID: 1538565
- Burnier, M., & Egan, B. M. (2019). Adherence in hypertension: a review of prevalence, risk factors, impact, and management. *Circulation research*, 124(7), 1124-1140.
- He, J., Whelton, P. K., Appel, L. J., Charleston, J., & Klag, M. J. (2000). Long-term effects of weight loss and dietary sodium reduction on incidence of hypertension. *Hypertension*, 35(2), 544-549. doi: 10.1161/01.hyp.35.2.544. PMID: 10679495.
- Whelton, P. K., Appel, L., Charleston, J., Dalcin, A. T., Ewart, C., Fried, L., ... & Blethen, E. (1992). The effects of nonpharmacologic interventions on blood pressure of persons with high normal levels: results of the Trials of Hypertension Prevention, phase I. *Jama*, 267(9), 1213-1220. doi: 10.1001/jama.1992.03480090061028. Erratum in: *JAMA* 1992 May 6;267(17):2330. PMID: 1586398.
- Unger, T., Borghi, C., Charchar, F., Khan, N. A., Poulter, N. R., Prabhakaran, D., ... & Schutte, A. E. (2020). 2020 International Society of Hypertension global hypertension practice guidelines. *Hypertension*, 75(6), 1334-1357.
- Haghdoost, F., Gnanenthiran, S. R., Shan, S., Kaistha, P., Huang, L., Tian, M., ... & Rodgers, A. (2024). The effect of salt substitution on frequency and severity of headache: results from the SSaSS cluster-randomised controlled trial of 20,995 participants. *European Journal of Clinical Nutrition*, 78(5), 401-406. doi: 10.1038/s41430-024-01419-7. Epub 2024 Feb 24. PMID: 38402353; PMCID: PMC11078726.
- Wang T, Chang TI, Neumiller JJ, Alicic RZ, Daratha KB, Tuttle KR. (2022). Potential and Pitfalls of Salt Substitutes in Chronic Kidney Disease. *Am J Kidney Dis*. 79(5):715-26.